

ENTOMOLOGY

Project title: Butterflies of Yellowstone and Grand Teton National Parks (also *odonata*)

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Objective: The objectives of the research are: 1) photograph butterflies, dragonflies, and damselflies within the borders of Yellowstone National Park. 2) Produce field guides to the above mentioned insects for the use of the general public. 3) Donate book quality slides to the Museum located at Mammoth Hot Springs at the Albright Visitor Center. 4) Produce additional writings based upon scientific observations of the behaviors, abundance, and all other factors related to butterflies, dragonflies, and damselflies.

Findings: Slides were obtained for the following dragonflies: Common Whitetail, Variable Darner, Pacific Spiketail, American Emerald, Flame Skimmer, White-faced Meadowhawk, Western Pondhawk, and Dot-tailed Whiteface. Slides were obtained for the following damselflies: Tule Bluet, Common Spreadwing, and Emerald Spreadwing. We specifically want to obtain slides for the following butterflies; Lustrous Copper, Green Hairstreak, and True Skipper. Work on the text of the butterfly field guide has begun. There are many more wetland areas within the Park that we need to visit. Wetlands are to be found parkwide and therefore we need access parkwide in order to complete our research. We also need to access the park in the winter season in order to observe dragonfly and damselfly larvae in thermal waters. Our findings include: dragonflies can withstand temperatures up to almost 90°F and prefer waters within the neutral range of pH.

**Project title: Assessment of Host Races in the Ovary-Feeding Beetle,
Brachypterolus pulicarius (Coleoptera: Nitidulidae)**

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Additional investigators: Kelly Hering, Bryan FitzGerald

Objective: This continuing research is being completed as part of a Master's thesis project for Kelly Hering at Montana State University. Beetles have been collected in order to investigate the existence of host races in the species *Brachypterolus pulicarius*, a natural enemy of yellow and Dalmation toadflax. Because the beetle exists on the two separate host plant species, the question of whether *B. pulicarius* actually consists of two distinct host races is being examined. In selecting sites for collection of beetles, locations were sought where no intentional releases of *B. pulicarius* have ever been made. Rather, populations of the beetles were collected in areas where they had been introduced accidentally with their host plants. Because the beetle has never been introduced into Yellowstone National Park, and because both host plant species are present within its boundaries, the Park offers an excellent opportunity to harvest insects as they naturally occur on their host plants. Along with sites in Yellowstone, others in Canada and throughout the northeastern United States are being analyzed via molecular genetic techniques.

Findings: During the summer of 2001, populations of *B. pulicarius* at research sites throughout Montana and Wyoming supported only very low numbers of beetles. Suspected causes of this low population density are the extreme drought conditions being suffered in these areas for the past several years as well as late spring snows that fell in June. Because of these conditions, no beetles were collected in Yellowstone during the summer of 2001. DNA has been extracted from all beetles previously collected in Yellowstone. During 2001, an optimized amplified fragment length polymorphism (AFLP) protocol was developed for the beetles, and amplification reactions were completed. The number of sites for final analysis was narrowed to include only one Yellowstone site where large numbers of individuals were collected. Final analyses are currently being conducted, with an anticipated conclusion of the project by the summer of 2002.

Project title: Respiratory Physiology and Thermal Preference in Thermophilic Aquatic Insects

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Objective: 1) To understand the degree to which the peculiar respiratory physiology of water scavenger beetles correlates with environmental variation in thermal areas. 2) To understand the degree to which thermal preference in water scavenger beetles reflects respiratory stress and successful dispersal from thermal pools having potentially lethal temperatures. 3) To understand the degree to which thermal preference in dragonfly niads correlates with development and territorial contests.

Findings: To date, we have shown that the respiratory complex of water scavenger beetles functions essentially as an oxygen reservoir at summertime temperatures. This is not consistent with long-

standing theoretical predictions that the plastron/macropastron complex will function as a “physical gill” deriving oxygen dissolved in ambient water into the gas phase for tracheal ventilation.

Preliminary findings show clear habitat partitioning, with respect to ambient water temperature and dissolved oxygen tension, between two species of dragonfly.

**Project title: The Mosquito of Yellowstone National Park, A Study of
Their Species and Their Biology**

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Additional investigators: Dr. Robert Garrott, Dr. Charles Schwartz

Objective: To determine mosquito species present and their biology.

Findings: No collections were made during the year 2001.